

Preliminary

General Specification

TENTATIVE

Product name : Infrared Communication Unit

Model : RY5FD01D

Sharp Corporation
Electronic Components Group
Components Division

These products are under development. These specifications are subject to change without notice.
It is advisable to consult your local Sharp sales engineer when considering these products for
design – in and production volume.

1. Scope

These specifications is applicable to the outline dimension, structure and characteristics of the RY5FD01D infrared communication unit.

- Major application :
- High speed IR mode(carrier wave : 850~900nm)
 - SIR mode(carrier wave : 850~900nm)
 - ASK mode(carrier wave : 850~900nm, subcarrier : 450- 550kHz)

2. Features

- bw Cost and Fast Infrared Data Link
- Backward Compatible to Slower Speeds
- Meets IrDA Physical Layer Specifications
 - 1cm to 1 Meter Communication Distance
 - 30° Viewing Angle

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※ 1 Channel – 9.6Kbps to 115.2Kbps, 1.152 Mbps/4.0Mbps

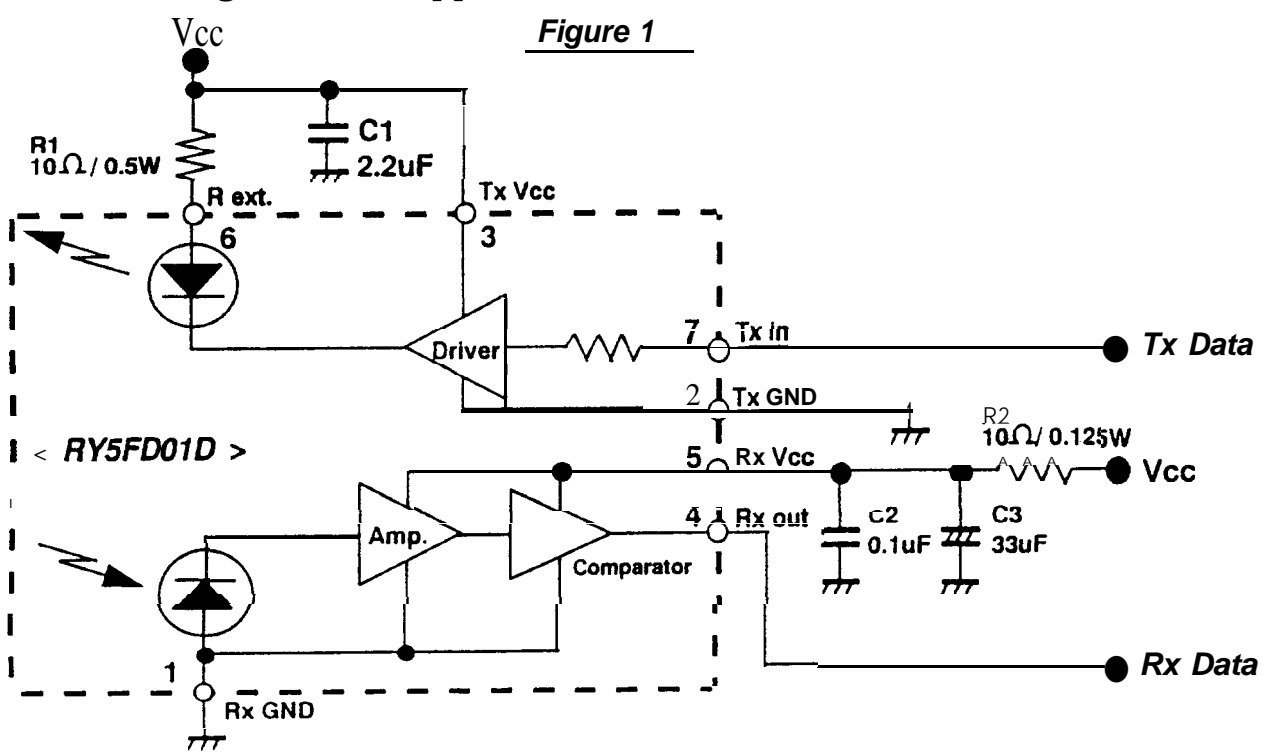
- ASK, IrDA1.0, IrDA1.1 Compliant
- No Program Adjustment Required in Selecting Communication Mode (IrDA1.0/1.1)
- Single RX out for both IrDA1.0/1.1 and ASK

The RY5FD01D contains a new high speed and high efficient ALGaAs LED(870nm), a silicon pi photodiode, and a new bipolar silicon integrated circuit. The IC contains an LED driver and a receiver providing one output signals RXout for data rate of 9.6 to 115.2Kbps, 1.152Mbps and 4Mbps.

The transceiver is originally designed to have direct interface to SHARP *UIRCC and selected I/O chips that incorporate the modulation/demodulation function.

※UIRCC : Universal Infrared Communication Controller

3. Block Diagram and Application Circuit



4. Recommended Application circuit Components

Components	Recommended Value		
C1	2.2 μ F \pm 10%	Ceramic	
C2	0.1 μ F \pm 10%	Ceramic	
C3 ※	33 μ F \pm 10%	Aluminium	
R1	10Q \pm 5%	0.5W	
R2 ※	10 Ω + 5%	0.125W	

※In case of high ambient noise, the peripheral components of C3 and R2 are recommended to be changed as shown below.

- C3:33#F \rightarrow 100 μ F
- R2 :10 Ω \rightarrow L1 : 33 μ H

5. Truth Table

Input		output	
Tx in	Infrared Light	LED	Rx out
VIH	x	High (on)	NV
VIL	High(on)	Low (off)	Low
VIL	Low(off)	Low (off)	High

- X : Don't care
- NV : Not Valid

6. Pin Output

Pin	Description	Symbol
1	Rx Ground	Rx GND
2	Tx Ground	Tx GND
3	Tx Supply Voltage	Tx Vcc
4	Receiver Data output	Rx out
5	Rx Supply Voltage	Rx Vcc
6	LED Anode (external Resistor)	R ext.
7	Transmitter Data Input	Tx in

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7. Rating and Specifications

7-1 : Rating

Item	Rated value	Unit
Operating power voltage	1.5 - 5.5	v
Operating temperature	() - +70	°c
Storage temperature	-25 - +85	°C
SIR bit rate	9.6 - 115.2	kbps
FIR bit rate	1.152/4	Mbps
ASK hit rate	9.6 -57.6	kbps

7-2 : Maximum rating

Item	Rated Value	Unit
Power supply	6	v
Duty ratio of TX signal	50	%

Note: Duty ratio of TX signal shows timerate of transmission wave form of H level at IRTX terminal. The frequency is less than 1kHz.

7-3 : Electrical and optical characteristics

Ta=25±3°C, Vcc=5±0.25V, ambient illumination on receptor surface of 100 lx less

Item	Condition	symbol	min.	typ.	max.	Unit
Current Consumption	No signal in all mode (Rx out : H, Tx in : L)	[cc1]			4	mA
	SIR mode transmission (Rx out : H, Tx in : Duty 3/16 115.2kbps)	Icc3			72	mA
	FIR(4Mbps) mode transmission (Rx out : H, Tx in : Duty 1/4 4Mbps)	Icc5			96	mA
	ASK mode transmission (Rx out : L L, Tx in : Duty)/2500kHz)	Icc2			192	mA
	Transmission (peak value)(all mode)			255	383	mA
Communication distance	SIR mode, 9.6 ~ 115.2kbps (note 1) Using standard transceiver on the other party	L2	min. 0.01 less ①		max. 1.00 over ①	m
	FIR mode, 1.152 Mbps/4Mbps (note 1) Using standard transceiver on the other party	L4	min. 0.01 less ①		max. 1.00 over ①	m
	ASK mode, 9.6 ~ 57.6kbps (note 1) Using standard transceiver on the other party	L1	min. 0.05 less ①		max. 0.8 over ①	m
Half width of receiver viewing angle		$\Delta\theta 1$		45		deg
Half angle of transmitted Infrared		$\Delta\theta 2$		15		deg
Peak wave length of transmitted infrared		$\lambda p2$	850		900	nm
Vx in (L level)		VIL2			0.4	v
Vx in (H level)		VIH2	2.8			v
Input current (Tx in)	VI=5V (note 2)	I IH2	1	3.5	5	mA
Rise time (transmission signal)	(note 3)	tr			35	nsec
Fall time (transmission signal)		tf			35	nsec

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Note : (1)The standard transceiver should be selected and submitted by Sharp for customers evaluation.

The standard transceiver should have typical performance in infrared transmission power and receiving sensitivity, and require mutual approval.

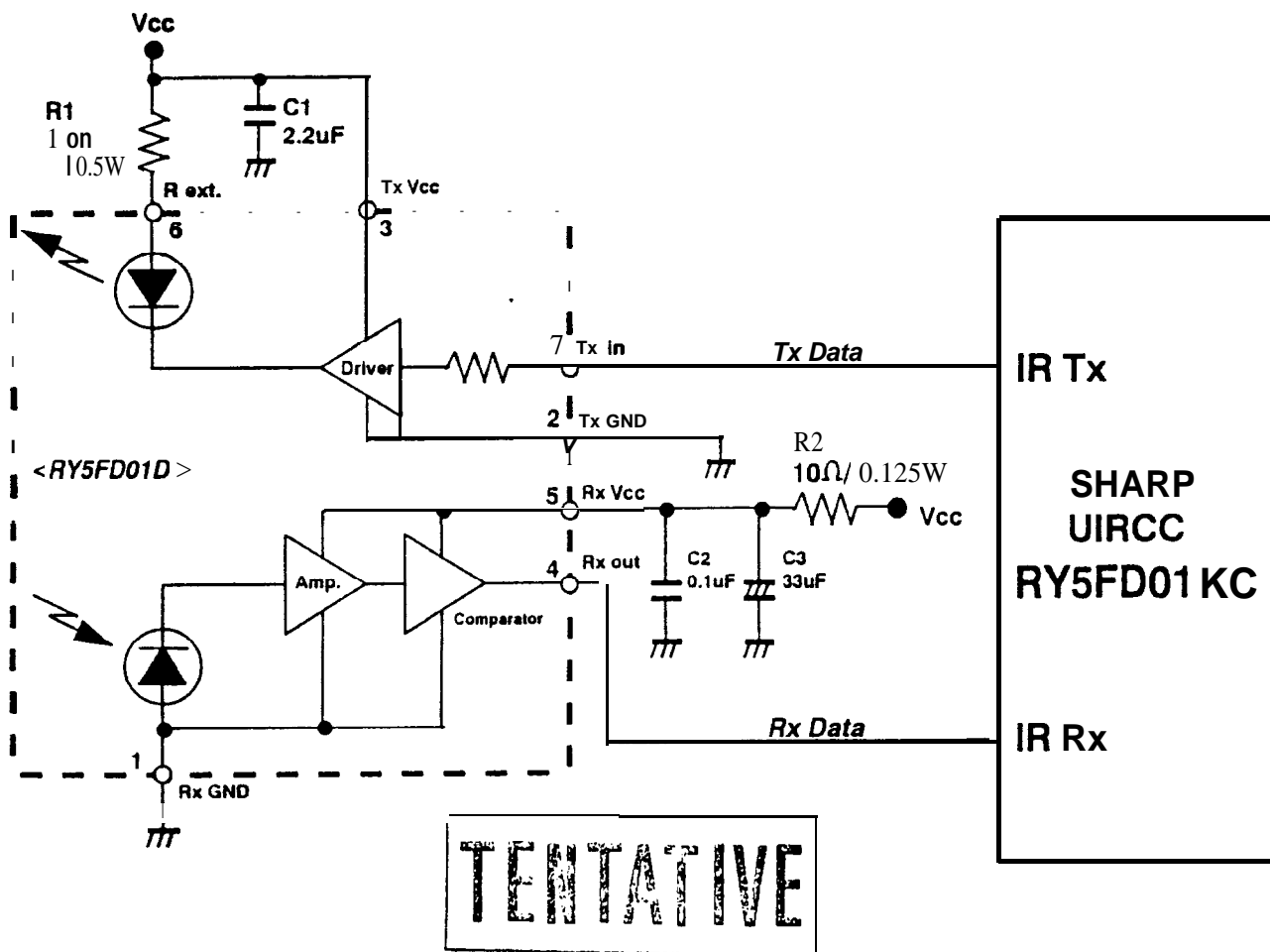
(2)This item should be measured under the condition of duty ratio 50% and width 30sec after the input of 1kHz pulse voltage for protection of LED.

(3)The rise time and fall time of transmission are defined as shown below ;



7-4 : Evaluation circuit of communication distance

Figure 2. Evaluation circuit for communication distance ①



Use specified infrared filter for all communication mode(ASK/IrDA1.0/IrDA1.1), and set Ir module at the height of 3 cm from the surface of desk. (Notebook PC height)

● Infrared filter : Mitsubishi rayon (Acryle - pet) PF - 0761.5mm thickness

7-5 : Caution on characteristics

(1) Communication distance

This infrared communication unit satisfies characteristics listed in Item 7-3 under the test condition that is shown in item 7-4. The communication distance may vary due to transmitted signal code format, spectrum of transmission unit, emission power of transmission unit, characteristics of modem circuit, and ambient light etc. Since the power lighted to receiving unit is in inverse proportion of square of the distance between transmission and receiving unit, the receiving distance will be doubled if emission power of transmitter is quadrupled.

(2) Caution in designing of infrared communication system

Material for the infrared filter on applications should have good transmittivity. Stronger resistance against ambient light should be gained by using the materials that only filter 810nm to 1000nm wave length.

Illumination light is considered to be main cause of malfunction on receiving unit.

Control the receiving beam angle and avoid direct illumination of ambient light to the photo diode

8. Dimension, structure and function

(1) Block Diagram and Application Circuit : as per figure 1.

(2) Dimension : as per figure 3.

(3) Washing : not allowed (LED should not be washed and stamp should not be erased.)

(4) recommended external circuit :

Each input and output are connected to interface circuit via modem circuit.

(refer to evaluation] circuit for communication distance in (Figure 2).)

Please use ceramic condensers that have good characteristics in high frequency for $2.2\mu F$ and $0.1\mu F$ condenser. As for connection to ground, connect large PCB pattern to both ground terminal and the chassis unit. Please be careful for the allowance DC current on inductance.

(5) Pin configuration : as per figure 1,

(6) Stamp of lot number

<Meaning of lot number>

- First digit : manufacturing place
- Second digit : last number of manufacturing year
- Third digit : manufacturing month
- Forth digit : manufacturing week
- Fifth digit : version (change as A, B, C. . . .)

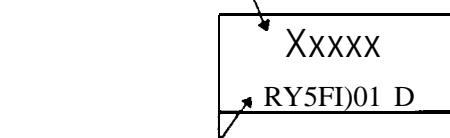


<Meaning of manufacturing month>

January : 1	July : 7
February : 2	August : 8
March : 3	September : 9
April : 4	October : 0
May : 5	November : N
June : 6	December : D

<Place of stamp>

Place of lot number



Model name (Back side)

(7) Marking of model name

The model name is marked back side of shield metal.

) Environmental test item

Test Item	Test Method
1 High temperature exposure test	After the test unit is left at $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 240 ± 8 hours, no abnormalities in the electrical and optical characteristics of the unit should not be observed.
2 High humidity and high temperature exposure test	After the test unit is left at $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and 90 to 95% humidity for 240 ± 8 hours, no abnormalities in the electrical characteristics of unit should be observed.
3 Low temperature exposure test	After the test unit is left at $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 240 ± 8 hours, no abnormalities in the electrical characteristics of the unit should be observed.
4 Temperature cycle test	After the test unit completes ten cycles in which it is left at (-25°C for 30 minutes, room temperature for five minutes, 85°C for 30 minutes room temperature for five minutes), no abnormalities in the electrical characteristic should be observed.
5 High temperature exposure test load test	After the test unit is left at 70°C with power on for 240 ± 8 hours, no abnormalities in the electrical and optical characteristics of the unit should be observed.
6 High temperature and high humidity load test	After the test unit is left at 70°C and 95% humidity with power on for 240 ± 8 hours, no abnormalities in the electrical characteristics of the unit should be observed.
7 Vibration test	Place the unit on a vibration platform at actual mounting, vibrate the unit 5 to 500Hz with acceleration 0.6G for two hours in each of the X, Y and Z directions (total 6 hours), no abnormalities in the electrical characteristics and external appearance of the unit should be observed.
8 Shock test	After applying a shock of 780m/s^2 for 1 ms once in each of the X, Y and Z directions, no abnormalities in the electrical characteristics and appearance of the unit should be observed, except for pins area and installing area of metal shielding.
9 Electrostatic test	After voltage of under the condition $\pm 200\text{v}$, $R_s=0\Omega$, $C=200\text{pF}$ on total 3 times is applied to each pins of the test unit no abnormalities in the electrical characteristics and appearance of the unit should be observed. After the electric discharge of $\pm 10\text{kV}$, $R_s=500\Omega$, $C=200\text{pF}$ on total 3 times is applied to the surface of the unit, lead area and bezel, must not be broken.

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Note :

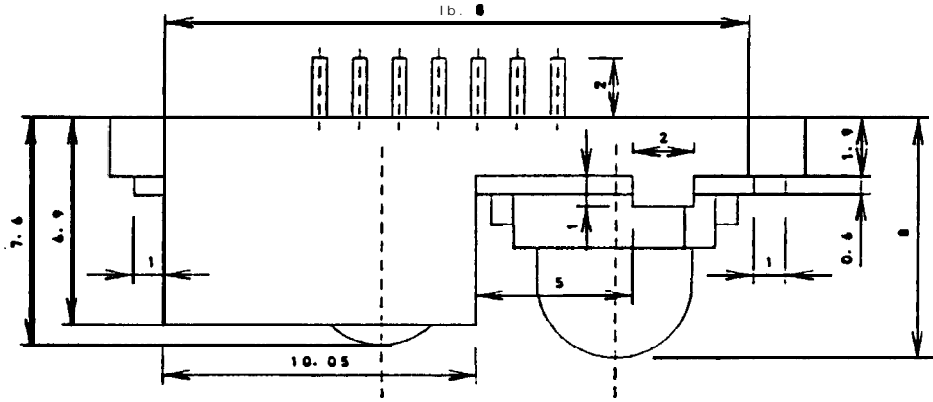
1. Test item 1 to 6 should be measured after leaving the test unit in room temperature and humidity over 2 hours.
2. In measurement, the test unit has no dew fall, and the lens surface of diode in transceiver must be cleaned.
3. Judgement condition of electronic characteristics : Receivable distance must satisfied 70% of maximum distance

11. Components list

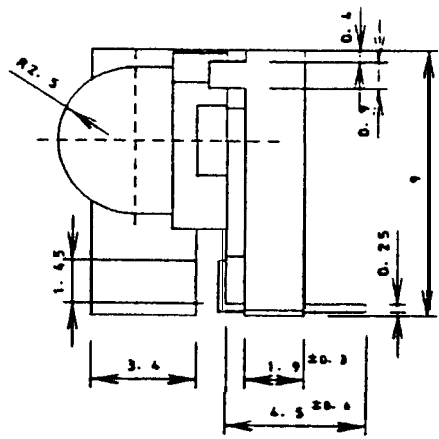
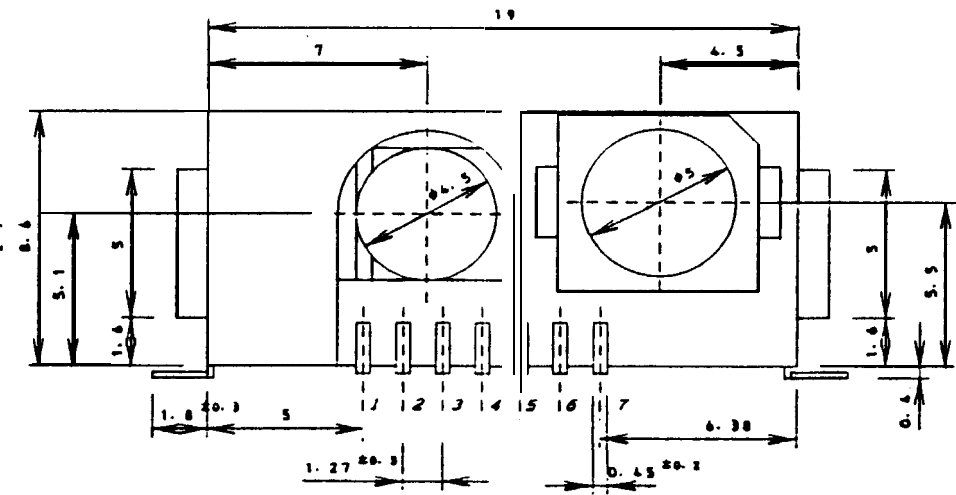
Component name		num bers
Chip condenser	CH/J/50V	1
	B/K/50V	1
	F/Z/16V	6
Chip resistance	CY) 1/16W	7
IC	Silicone monolithic IC	1
Infrared emitting diode		1
Silicone photo diode		1
Pin		7
PCB	Glass epoxy (1 layers) t=0.6mm	1
Shielding case	SPCC(solder plating) t=0.2mm	1

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[Outline drawing]



- 1. Rx GND
- 2. Tx GND
- 3. Tx Vcc
- 4. Rx out
- 5. Rx Vcc
- 6. R EXT
- 7. Tx in

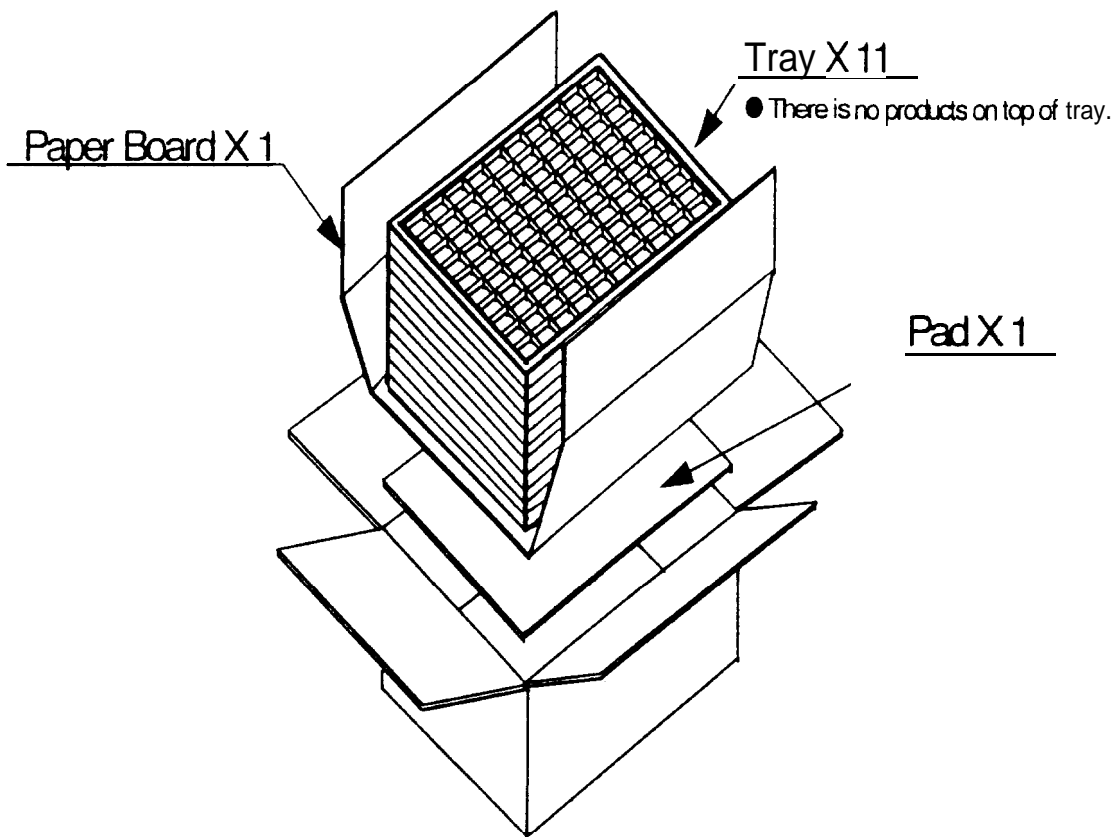


Common Tolerance ± 0.08 mm

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 SHARP PROPRIETARY

APPLICABLE MODEL		AIRYSFD01D		SCALE	UNIT	AL.		
				4/1	1 = 1/1 mm	At.		
THICKNESS	PIECES	MATERIAL	FINISH		DATE	REVISE	CHARGE	
t=0.6mm							OUT LINE DRAWING	
DATE	.996. 3. 22							
APPROVE	CHECK	CHECK	DRAW	ESIGN				
SHARP CORPORATION					CODE			
					DRAWING No.			

13. Packing

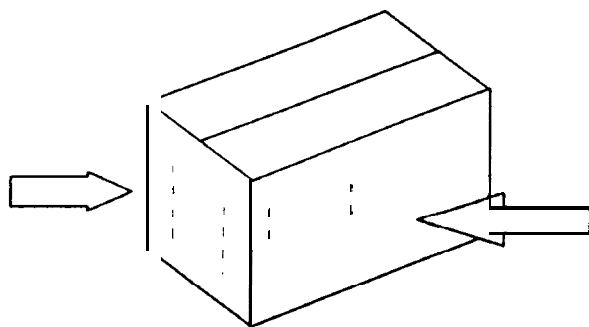


1000 pcs / carton

SHARP
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TYPE	RY5FD01D
	A3RY5FD01D
QUANTITY	1000 pcs
DATE	(())(())(())

↑ ↑ ↑
Month Day
Christian Era (2 digits)



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14. Precaution on Use

- (1) If the surface of the infrared LED and photodiode are dirty or dusty, communications capabilities may be effected. In such case, wipe them gently with a soft cloth and avoid scratching the surfaces. If solvent is needed, use methyl alcohol or ethyl alcohol, and be careful not to let the solvent seep inside of the communication unit. Please note that the lot number is stamped.
- (2) Avoid using the communications unit under dew condensed condition.
- (3) If the electronic noise of the power supply is large, attach an external low pass filter close to the communication unit pin out. Electronic noise of the power supply is of particularly concerned for the use of IrDA-SIR method.
- (4) Noise may be observed on output because of the noise through the receiver and emitter windows and, although the shielding case blocks electromagnetic and electrostatic noise from inside and outside of the unit.
Especially, keep the communication unit away off the noise source such as DC-DC converter and LCD backlight, or the wired line from the noise source.
- (5) Infrared communications systems do not transfer signals with 100% accuracy due to the effects of external light. This unit is intend for use in consumer electronics for home use in principle, and should not be used for power control, security, medical equipment, and other applications what "might have a threat to personal safty.
- (6) When treating the communication unit, be careful of an angle of PCB and sheilding case, and ballanced lead wire of photodiode and LED. Never touch surface and balanced lead wire of LED and PD.

15. Miscellaneous

- (1) If any questions arise concerning these specifications, both sides will cooperate in good faith to resolve the problem and revisions will be made through mutual agreement.
- (2) when changes are made to this product specifications, as a general rule, prior approval will be oabtained.
- (3) Because these specifications include copyrighted material belonging to the Sharp Corporation, this manual should be handled with care and may not be reproduced without the permission of Sharp Corporation.
- (4) The Components Division does not use fluorocarbons in its manufacturing processes.

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